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BIOTECHNOLOGY: OPTIONS FOR AGENDA 21

Report of the Secretary-General of the Conference

I. INTRODUCTION

1. This paper was prepared by the UNCED Secretariat in response to decision 2/10 of the Preparatory Committee at its second session, which took note of the progress report on the environmentally sound management of biotechnology (A/CONF.151/PC/29), following on the requests made in decision 1/17 of the first session of the Preparatory Committee to have a full discussion of relevant aspects of environmentally sound management of biotechnology at its third session. Given the linkages of certain aspects of biotechnology to the negotiations for a convention on biological diversity, the Secretary-General of UNCED was requested to investigate further the potential areas for action in the light of the comments made at the second session. 1/

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2. This paper suggests possible response options for Agenda 21 to meet the most critical issues identified in the Background paper (A/Conf.151/PC/67).

3. Biotechnology, like all technologies, when applied with proper care and safety, could help, for example, to promote the protection of human health; to enhance food security through sustainable agriculture; to minimize hunger and alleviate poverty; to enhance the industrial development process that transforms raw materials much more efficiently; to support reforestation and afforestation activities; and to detoxify hazardous wastes.

4. The proposed options constitute an integrated package of programmes that could facilitate and accelerate the environmentally sound management of biotechnology.

II. OPTIONS FOR AGENDA 21

Biotechnology Objectives

5. The options for Agenda 21 focus on four principal objectives, which respond to the needs identified in the Background paper:

a. Increase food productivity in sustainable agricultural systems through the use of advanced biotechnology applications.

b. Improve human health globally by combatting both communicable and non-communicable diseases by the year 2000.

c. Prevent and halt environmental degradation, as well as preserve environmental integrity, by the judicious application of biotechnology.

d. Implement effective global safety procedures.

Proposed Programme Areas

6. The following major programme areas are proposed as options for consideration by the Preparatory Committee:

A. Increase plant and animal productivity.

B. Improve health care.

C. Improve environmental protection.

D. Enhance safety.

E. Establish enabling mechanisms.

7. For the implementation of these proposed programmes and the potential activities, national governments, United Nations programmes and agencies, bilateral and multilateral development assistance organizations, industry, and the appropriate non-governmental organizations should collaborate to undertake the below-mentioned programmes.

A. INCREASE PLANT AND ANIMAL PRODUCTIVITY

Basis for Action

8. Rapid population growth, plant, animal, and human diseases, and accelerating environmental deterioration are some of the important factors mitigating against increased food production on a global basis. New technologies will be required to supplement current agriculture. Crop and animal improvement programmes and biotechnology now offer advanced tools. These applications would not only have to to increase productivity, but also contribute to more sustainable agriculture and protection of the human health and the environment.

Objectives

9. The aim of this programme is to increase food productivity in sustainable agricultural systems through the use of advanced biotechnology applications. The specific objectives include:

a. Increase plant and animal productivity by 25 percent by the year 2000.

b. Reduce dependence on pesticides for food, feed, and fibre by 25 per cent by the year 2000.

c. Increase productivity on marginal lands through the use of nitrogen fixation and mycorrhiza and reduce dependency on chemical fertilizers.

Activities

10. The proposed activities of this programme include:

a. Use of conventional technology and biotechnology to develop transgenic (genetically modified) plants that are resistant to biotic and abiotic stresses.

b. Use of traditional technologies on nitrogen fixation and myccorhiza in conjunction with advanced molecular biology techniques, to improve nitrogen fixation efficiency of symbiotic organisms in legumes and grasses, and phosphorous uptake capacity by crops.

c. Use of conventional technology in conjunction with animal reproduction and animal health biotechnologies to accelerate animal breeding for specified needs, and rescue endangered native livestock for breeding purposes.

d. Provide adequate institutional infrastructure.

e. Accelerate technology transfer and acquisition through international cooperation.

f. Address issues related to germplasm resources, intellectual property rights, and harmonize bio-safety procedures.

B. PROMOTE IMPROVED HUMAN HEALTH

Basis for Action

11. The protection and enhancement of human health is one of the most important objectives of development. The degradation of environmental quality, for example, by air and water pollution, soil contamination, toxic chemicals and hazardous wastes, is of increasing concern. There is also an increase in communicable and vector-borne diseases, compounded by malnutrition, inadequate human settlements, and lack of sanitation facilities. The health and well-being of people are therefore expected to be subjected to increasing risks, which in turn affect the productivity and innovativeness of the individual.

12. Improving human health care is a priority. This is one of the major areas that has already benefitted from biotechnology development. There is a need to accelerate and increase this development.

Objectives

13. Foremost is the objective to promote the health of people of all ages, protecting them against both communicable and non-communicable diseases. The target is to achieve health for all by the year 2000. Most of the proposed activities are expected to be completed before the year 2000.

Activities

14. The possible activities include:

Universal immunization:

a. Develop new and improved vaccines against major communicable diseases that are efficient, safe, and protect the individual with least number of doses. The vaccine should be stable to higher temperatures and preferably orally delivered. It should also be possible to combine and deliver a number of vaccines in a single dose for multiple disease protection of the number at birth.

b. Control of disease vectors, such as mosquitos, through the use of biological control agents.

Development and use of specific diagnostics:

c. Develop and utilize new diagnostics based on monoclonal antibodies and DNA probes for the early, accurate solution of various diseases for enabling prompt treatment with care.

d. Facilitate use of diagnostics under unsophisticated conditions by semi-skilled personnel.

Development of new therapeutic and growth promoting agents:

e. Develop and facilitate the use of hormones and its agonistics and antagonists (e.g. Insulin, Growth hormone).

f. Develop agents that promote cell growth and modulate immunity systems (e.g. cytokinins, TNF, EGF).

Development of new population control agents using natural body mechanisms and biotechnology leading to safe, reversible, and long-lasting methods.

Development of new drugs based on molecular designing:

g. Develop new pesticides and other chemicals designed through computer simulation and modelling using receptor-drug/receptor- pathogen interactions.

h. Develop new drug delivery systems to deliver drugs to target sites and which are useful in the treatment of problematic diseases and organs (e.g. cancers, brain tissues).

Development of safe and effective methods of detection and treatment of genetically inherited and inborn diseases using DNA probes and gene therapy.

C. ENVIRONMENTAL PROTECTION

Basis for Action

15. Environmental protection is a prerequisite for sustainable development. Various processes have therefore been, or are being developed, to improve environmental quality. The expanding world population is generating, and will continue to generate, more wastes resulting from the use of more chemicals, more energy, and more agricultural and industrial products. A real danger lies in the short- and long-term effects on human health and biosphere from the millions of tons of wastes and toxic chemicals produced daily and scattered about the earth.

16. In nature, there is a continuous recycling and stabilization of organic wastes and chemical substances. As a result of population growth, the amount and kind of wastes generated now in contact with the natural environment, including man-made chemicals, are beyond the capacity of the organisms involved in waste recycling. The persistence, mobility, and toxicity of chemicals in natural environments needs considerable attention.

17. The need for a rich genetic pool of plant, animal, and microbial germ plasm for biotechnology to develop is well established. Biotechnology may play an important role in supporting rehabilitation of degraded ecosystems and landscapes through germ plasm conservation and development of varieties.

Objectives

18. This proposed programme aims to apply biotechnology to prevent, halt, and reverse environmental degradation, as well as preserve environmental integrity.

Activities

19. The proposed activities for this programme call for the following:

Recycling and upgrading of organic wastes and biomass:

a. Develop biotechnologies that can be used at the global level to provide energy, animal feed, and raw materials from organic wastes and biomass.

b. Develop policies for reducing waste generation and increasing the use of biodegradable materials.

Development of cleaner and safer production technologies:

c. Develop biotechnologies for substituting environmentally unsound chemical pesticides and fertilizers with environmentally sound alternatives.

d. Use integrated pest management approaches that include bio-control agents.

e. Use bio-fertilizers within national fertilizer programmes.

f. Improve production processes and economics of bio-control agents and bio-fertilizers.

g. Develop a supportive framework of international agreements for training, research and development, among others.

h. Develop policies for realizing the full potential of cleaner technologies and reduce reliance on chemical pesticides and fertilizers.

Pollution control:

i. Develop biotechnologies for removal of pollutants from the environment where conventional techniques become expensive and inefficient or are non-existent.

j. Develop policies for waste management before disposal.

k. Support research to understand the behavior of chemicals in natural environments to devise means to bring about their destruction.

Development and use of germ plasm.

Land rehabilitation.

Application of biotechnology to forestry and other biomass.

D. ENHANCE SAFETY

Basis for Action

20. The community at large can only benefit fully from the potential of biotechnology if adequate safety procedures are applied. There is a need for internationally acceptable safety procedures. For this purpose, action to be undertaken could build upon procedures for safety that are already developed nationally and internationally.

Objectives

21. This proposed programme could, wherever possible, build on planned or existing activities to enhance safety in biotechnology development and application through international cooperation.

Activities

22. The proposed activities for this programme call for international cooperation which could be directed towards the following:

Make the safety procedures easily available and applicable to all countries:

a. Make widely available the existing safety procedures by collecting the existing material and adapting this material to the specific needs of different countries and regions.

Further Develop and harmonize these safety procedures:

b. Develop safety procedures to promote scientific development and categorization in the areas of risk assessment and risk management (information requirements, databases, procedures for assessing risks, establishment of safety conditions, monitoring and inspections).

c. Harmonize safety procedures into a set of internationally acceptable guidelines for safety, possibly in the form of a Code of Conduct, taking into account decision 1/17 of the Preparatory Committee at its first substantive session.

Support direct assistance upon request:

d. Establish a network of national and regional contact points, and an international coordination centre.

e. Give direct assistance upon request, by the international coordination point, using information networks, databases and information procedures.

E. ENABLING MECHANISMS

Basis for Action

23. Inadequate treatment and disposal of rural, urban, agricultural, and industrial wastes are contaminating surface and ground water as well as the soil, posing serious risks to human health and the environment. Injudicious use of chemical pesticides has led to the accumulation of toxic residues in the environment and many insects, pests, and other disease vectors are showing increasing resistance to pesticides.

24. The environmentally sound and safe application of biotechnology has the potential to ameliorate many of these problems. There is therefore a need to accelerate the development and application of biotechnologies, particularly in developing countries.

Objectives

25. The proposed programme incorporates the following targets and wherever possible, could be built on existing or planned activities:

a. To accelerate the environmentally sound and safe applications of biotechnologies, particularly in developing countries.

b. By the year 1994 establish a Biotechnology Consortium or Corporation for Development, as a joint venture by developing countries, bilateral and multilateral agencies, and the private sector, to provide new mechanisms for developing countries to accelerate the development, acquisition, and adaptation of non-proprietary and proprietary technologies.

Activities

26. The proposed activities for this programme may include:

a. Undertake detailed pre-investment feasibility studies for a joint venture among prospective shareholders from developing countries, bilateral/multilateral agencies and private sector.

b. Evaluate priority needs of developing countries.

c. Identify environmentally safe and sound technologies for transfer.

d. Identify financial and other benefits for participating partners in a consortium.

Notes

1/ GA.A/46/48, 25 May 1991.